CLAIMS

1. Condensation heat exchanger, associated with a gas or fuel oil burner (40), which is composed of two parallel tube bundles, one (21) termed "primary" and the other (33) termed "secondary", each of these two bundles consisting of a tube, or a group of tubes disposed end to end, forming a helical coil, in which the wall of the tube(s) being made of a good thermal conductor and having a flattened and oval cross section with the major axis perpendicular, or approximately perpendicular, to that of the helix, while the width of the interstice separating two adjacent turns is constant and markedly smaller than the thickness of the said cross section, these two bundles being disposed close together and fixedly mounted within an envelope (1) which is impermeable to the gases, and communicating one with another via a collector (11) termed "transfer", means being provided to cause circulation of a fluid to be heated, in particular liquid water, firstly within tube(s) constituting the said secondary bundle (31), then - via the said transfer collector (11) - to the interior of the tube(s) constituting the said primary bundle (21), the said envelope (1) surrounding the two tube bundles while being closely spaced from each of them, this envelope (1) having a discharge cuff (7) for burnt gases, positioned in the neighbourhood of the said secondary bundle (31), this exchanger being formed so that the hot gases generated by the burner (40) pass radially, or approximately radially, passing through the interstices separating their turns, firstly through the primary bundle (21) and then the said secondary bundle (31), and

are then discharged from the exchanger through the said cuff (7), characterised in that:

- the said burner (40) is a cylindrical burner whose diameter is substantially less than that of the primary bundle (21), and which is mounted coaxially within the latter, extending axially over all, or practically all, of its length;

- the axial dimension (l_2) of the said secondary bundle (31) is substantially smaller than that (l_1) of the said primary bundle (21), so that an available space is formed facing an end portion of the primary bundle, in the prolongation of the shorter secondary bundle;

- this available space is occupied by an enclosure (9) which communicates with the internal space (3) of the secondary bundle;

- the said cuff (7) is connected to the wall of the said enclosure (9) so as to communicate with it, and is oriented transversely with respect to the axis ($X_2X'_2$) of the secondary bundle (31), so that its bulk in the axial direction fits into that of the enclosure (9).

2. Exchanger according to claim 1, characterised in that the tubes constituting each bundle (21, 31) each have rectilinear end portions (210-211, 310-311) the axes of these two end portions being located in a common plane which is tangent to the helix formed by the bundle, the openings being turned towards the outside of the exchanger from each side of the latter; that the end portions of the primary bundle are situated close to the secondary bundle, and vice versa, the said end portions having cylindrical openings passing fixedly and sealingly through the wall of the envelope (1) and penetrating, on one side of the latter, into a walled collector (100)

termed "inlet-outlet", capable of being connected to a supply duct for fluid to be heated and to a discharge duct for heated fluid, and on its other side, into the said transfer collector (11).

3. Exchanger according to claim 1 or 2, characterised in that the said envelope (1) comprises on the one hand a thin-walled tube length (14), of constant cross section, the approximately oval contour of this cross section being composed of two end portions of semicircular form connected by lateral rectilinear segments, and on the other hand a pair of closure plates, or "facades" (15a, 15b), the contours of which correspond to that of the said cross section and which extend perpendicularly of the axis of the said tube length, and each blocking one of the two openings, each semicylindrical portion (142, 143) of the said tube length (14) coaxially and partially surrounding (over a half-turn) one of the said bundles (21, 31).

4. Exchanger according to claim 3, characterised in that one (15a) of the said facades, denoted as "front façade", has an opening (150) capable of receiving a door (41) supporting the said burner (40) while enabling it to be demounted.

5. Exchanger according to claim 4, characterised in that the said door (41) also supports, on its outer side, a fan (4), or a simple cuff, enabling supplying the burner with a combustible gas mixture.

6. Exchanger according to one of claims 3-5, characterised in that each of the two facades (15a, 15b) is furnished with a thermally insulating disc (5, 6) facing the internal space (2) of the said primary bundle (21).

7. Exchanger according to one of claims 1-6, characterised in that the two bundles have the same diameter.

8. Exchanger according to one of claims 1-7, characterised in that the two bundles (21, 31) have their axes ($X_1X'_1$, $X_2X'_2$) horizontal and parallel.

9. Exchanger according to claim 8, characterised in that the two bundles (21, 31) are placed one above the other, their axes ($X_1X'_1$, $X_2X'_2$) being located in the same vertical plane (V).

10. Exchanger according to claim 9, characterised in that the secondary bundle (31) is placed above the primary bundle (21), means such as an inclined trough (8) intercalated between the two bundles being provided for preventing condensates which may form on the secondary bundle (31) do not fall onto the primary bundle (21) or the burner (40).

11. Exchanger according to claim 8, characterised in that the two bundles (21, 31) are placed one beside the other, their axes ($X_1X'_1$, $X_2X'_2$) being situated in the same horizontal plane (H).

12. Exchanger according to one of claims 1-11, characterized in that the axis (ZZ') of the said discharge cuff (7) is comprised in the plane containing the axes ($X_1X'_1$, $X_2X'_2$) of the two bundles.

13. Exchanger according to one of claims 1-11, characterised in that the axis (YY') of the said discharge cuff (7) is perpendicular to the plane containing the axes ($X_1X'_1$, $X_2X'_2$) of the two bundles.

14. Exchanger according to one of claims 1-13, characterised in that the wall of the said enclosure (9) is a cylindrical tube length coaxial with the secondary

bundle (31), of which one of the end edges is fixed against the envelope (15b) of the exchanger, while its other end edge is furnished with an annular flange (90) against which the secondary bundle (31) is supported, the said discharge cuff (7), also of cylindrical shape, connecting to the said tube length (9), perpendicularly to its axis ($X_2X'_2$).

15. Exchanger according to one of claims 1-11, characterised in that its envelope (1) has an inclined bottom (16) provided with an outlet connection (17), suitable for collecting and discharging condensates which may form on the secondary bundle (31).